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Growing and Grazing Seasons - Statistical Relationships

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The agroclimatic areal averages of growing season and grazing season were analysed with respect to averages of height, mean annual air and soil temperatures, and mean annual rainfall, within regions of similar climate.

Variations of growing season with height

Gradients varied from 16 to 32 days per 100 m (4.9 to 9.8 days per 100 feet). These compared favourably with previous estimates by Gloyne, Hogg, Smith and Roy, although Gloyne suggested 4.5 days per 100 feet in the Pennines and the North (working with air temperatures). See Table 1.

It is suggested that the following values are acceptable:-

	Days/100 m	Days/100 feet
Northern England) Midland England) & E Anglia)	15-20	5- 6
Wales	20	6
Southern England	20-25	6- 7
Southwest England	30-35	9-10

Estimations from limited data

Table 2, using mean annual air temperature, appears to provide a means of estimation; Table 3 gives slightly less significant relationships and in any case mean annual soil temperature is less likely to be available.

Variations of grazing season with height

Details are given in Table 4. The following values may be thought acceptable:

	Days/100 m	Days/100 feet
North East England & Midlands	45-50	14-16
North West England & Wales	33-40	10-12
East & Southeast England	40-45	12-14
Southwest England	65-75	20-23

Estimations from limited data

Details are given in Tables 5, 6 and 7. Table 5, using height and average annual rainfall appears to be the most useful. The multiple correlations in Tables 6 and 7 are high, but the coefficients in the formulae show too much variation to encourage extrapolations.

Table 1

Variation of growing season with height (h in metres)

	Correl		Days/100 feet
North East	(0.93)	257.4-0.215h	6.5
North West	(0.99)	264.4-0.21h	6.4
Midlands	(0.62)	262.6-0.16h	4.9
East		insufficient height change	
South East	(0.74)	276.9-0.21h	6.4
South West	(0.60)	309.8-0.23h	7.0
Devon Cornwall	(0.90)	332.1-0.32h	9.8
Wales	(0.98)	287.8-0.2h	6.1

Table 2

Variation of growing season with mean annual air temperature (T_a)

North East	(0.94)	28.1 T_a - 6.6
North West	(0.99)	28.3 T_a - 11.0
Midlands	(0.94)	25.9 T_a + 5.7
East & South East	(0.95)	41.5 T_a - 145.0
South West	(0.92)	42.7 T_a - 139.6
Wales	(0.97)	28.6 T_a - 7.7
England & Wales	(0.92)	29 T_a - 17.1

Table 3

Variation of growing season with mean annual soil temperature (T_s)

North East	(0.94)	35.2 T_s - 81.1
North West	(0.99)	29.9 T_s - 37.9
Midlands	(0.83)	24.3 T_s + 5.75
East & South East	(0.92)	23.2 T_s + 19.5
South West	(0.89	39.3 T_s - 138.3
Wales	(0.95)	24.8 T_s + 9.8
England & Wales	(0.93)	26 T_s - 4.6

Table 4

Variation of grazing season with height (h in metres)

North East	(0.97)	238.5-0.44h	13.4
North West	(0.95)	204.7-0.33h	10.0
Midlands	(0.92)	276.1-0.53h	16.2
East & South East	(0.65)	260.9-0.42h	12.8
South West	(0.38)	287 -0.7 h	21.3
Wales	(0.91)	221 -0.38h	11.6

Table 5

Variation of grazing season with height (h metres) and average annual rainfall (R_a mm)

North East	(0.98)	304.8-0.25h	- 0.12 R_a
North West	(0.97)	253.1-0.19h	- 0.064 R_a
Midlands	(0.98)	385.2-0.2 h	- 0.2 R_a
East & South East	(0.97)	340.7-0.115h	- 0.14 R_a
South West	(0.88)	306.5-0.61h	- 0.03 R_a
Wales	(0.99)	300 -0.2h	- 0.09 R_a

Table 6

Variation of grazing season with mean annual air temperature and rainfall

	Correl					
North East	(0.99)	163.7	+ 19.4 T_a	-	0.19 R
North West	(0.99)	-239.3	+ 46.1 T_a	-	0.002 R
Midlands	(0.99)	211.1	+ 19.4 T_a	-	0.24 R
East & South East	(0.97)	151.0	+ 21.5 T_a	-	0.18 R
South West	(0.94)	-304.3	+ 61.7 T_a	-	0.1 R
Wales	(0.99)	35.0	+ 26.0 T_a	-	0.09 R
England & Wales	(0.97)	19.5	+ 29.3 T_a	-	0.1 R

Table 7

Variation of grazing season with mean annual soil temperature and rainfall

North East	(0.98)	- 63.7	+ 38.9 T_s	-	0.13 R
North West	(0.99)	-177.2	+ 39.8 T_s	-	0.027 R
Midlands	(0.99)	235.0	+ 16.9 T_s	-	0.26 R
East & South East	(0.97)	229.0	+ 13.8 T_s	-	0.19 R
South West	(0.86)	-141.4	+ 44.6 T_s	-	0.13 R
Wales	(0.99)	72.3	+ 21.1 T_s	-	0.1 R
England & Wales	(0.95)	72.8	+ 23.2 T_s	-	0.12 R

Any comments or suggestions on this paper should be referred to the author.

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